

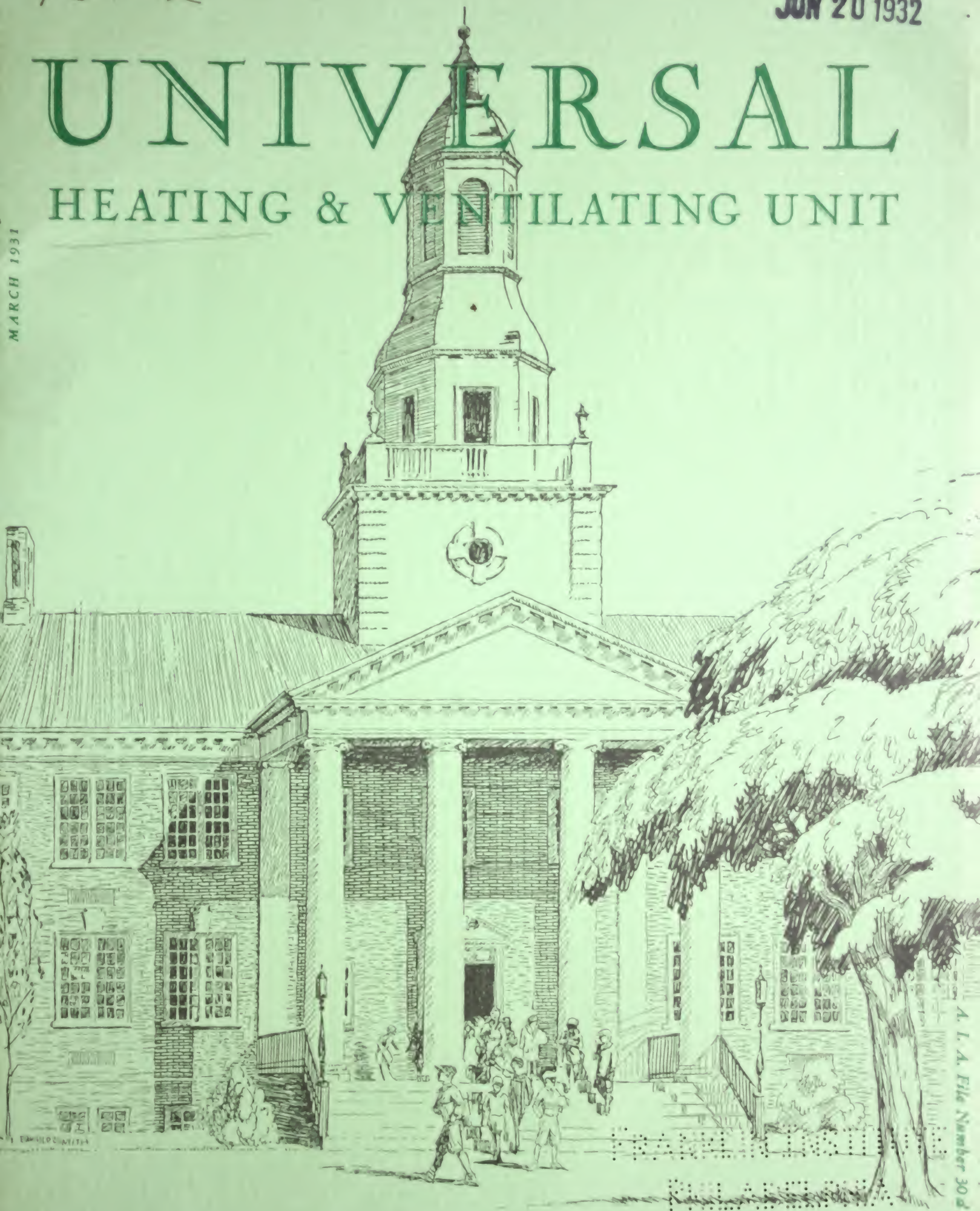
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JUN 20 1932

UNIVERSAL

HEATING & VENTILATING UNIT

MARCH 1931



A. I. A. File Number 30d11

FRANKLIN INSTITUTE
PHILADELPHIA



MILLIONS of school children, over a period of 19 years, thruout the United States and Canada, have been benefited by the installation of UNIVERSAL Quiet Operating Heating and Ventilating Units.

Over 30,000 UNIVERSAL Quiet Operating Units are now supplying clean air to school-rooms, *evenly distributed at the correct temperature without drafts.*

JOHN J. NESBITT, INC.

Executive Office and Factory, HOLMESBURG, PHILADELPHIA, PA.

11 PARK PLACE, NEW YORK CITY

PUBLICATION NO. 214

UNIVERSAL TYPE A UNITS

A. I. A. FILE NUMBER 30-D-11

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Universal High Velocity Vertical Discharge

Universal high velocity *vertical* discharge Units provide a positive, ample supply of clean air, evenly distributed, at the correct temperature without drafts.

UNIVERSAL
Heating & Ventilating Unit

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED

Air

QUALITY vs. QUANTITY

THE quantity of air supplied to a room is no indication of the quality of the air and ventilation results cannot be measured alone in cubic feet of air per minute. The common conception of ventilation is that in delivering a given amount of fresh air to a room an equal amount of foul air is forced from the room. This is incorrect, for ventilation is a process of dilution.

AIR QUALITY DEPENDENT UPON *Proper Air Motion*

The fresh air supplied to the room dilutes the room air so that the quality of the air in the room depends to a very great extent upon how thoroughly the fresh air is mixed with the room air.

It will, therefore, be seen that air motion plays just as important a part in ventilation as air quantity. In order to have good ventilation it is necessary to have proper air motion, for quantity alone indicates that the air is being delivered merely to the room, while quantity with proper air motion results in an ample supply of clean air being delivered *to the occupants of the room at the correct temperature without drafts.*

AIR MOTION *Without Drafts* IN THE *Universal*

That air motion is so important a factor is responsible for the high velocity *vertical* discharge used in the UNIVERSAL quiet operating heating and ventilating unit since 1913. This high velocity *vertical* discharge results in a thorough diffusion of the fresh air thruout all parts of the room, producing that air motion which is so essential to good ventilation, and doing this *without drafts*.

UNIVERSAL Heating & Ventilating Unit

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED

Proper Mixing of Heated and Cool Air is Accomplished in the Universal

Temperature Control Damper partly open.
Note mixing effect and UNIVERSAL high
velocity *vertical* discharge.



Importance of VERTICAL Discharge

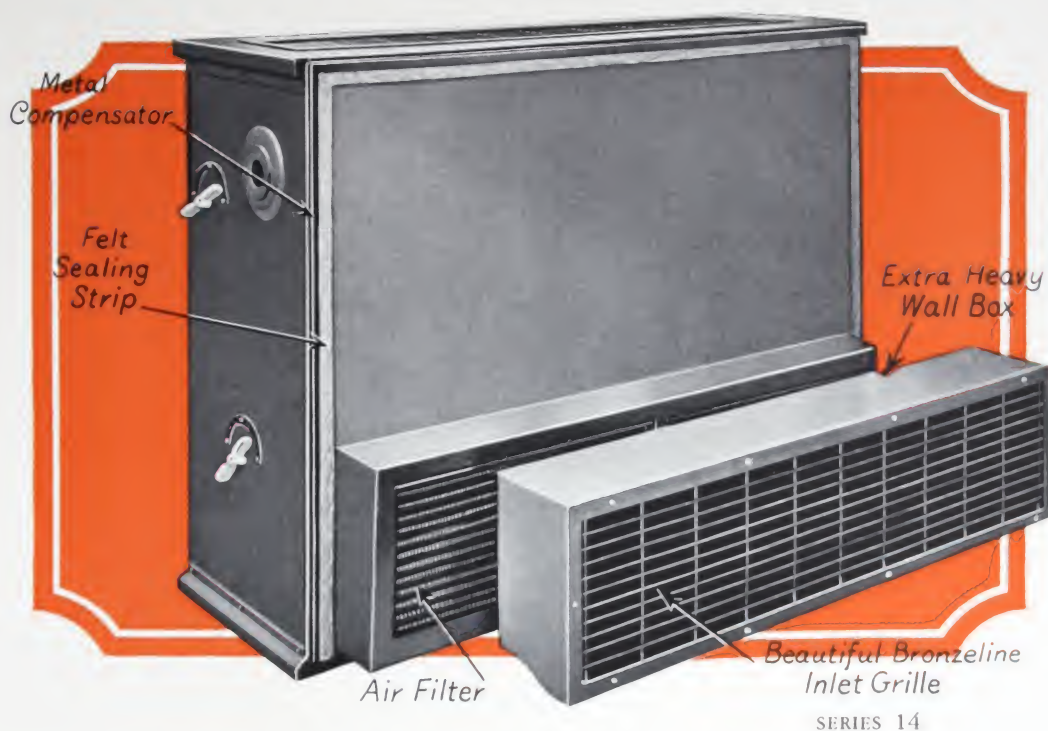
THE first unit embodying the high velocity *vertical* discharge principle was invented and constructed by Moses Hubbard in 1908. No other single factor has had as far-reaching effect on schoolhouse heating and ventilating as the high velocity *vertical* discharge which Hubbard incorporated into the original device. Since 1908 many units of this type have been manufactured, but in quite a few cases the importance of an absolutely *vertical* discharge has been overlooked.

Too much emphasis cannot be placed on the importance of the angle of discharge in ventilating units employing this principle.

In the design of all UNIVERSAL Units the fundamental principle of an absolutely *vertical* discharge at high velocity has been the subject of our closest attention. The above illustration clearly indicates the direction of discharge of the air from the UNIVERSAL Quiet Operating Unit during eighty per cent of the heating season, for it is safe to say that during the greater part of the season it is unnecessary to use the maximum capacity of the UNIVERSAL Unit radiator; therefore the temperature control damper will be in the position indicated above most of the time.

UNIVERSAL *Heating & Ventilating Unit*

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED



SERIES 14

Bronzeline Fresh Air Inlet Grille

UNIVERSAL quality starts with the bronze streamline "Bronzeline" grille, the same high standard of quality is maintained thruout the construction of the UNIVERSAL Quiet Operating Unit.

This Bronzeline grille, standard on all UNIVERSAL Units, is constructed of 1" wide, $\frac{1}{4}$ " thick bronze frame, supporting heavy brass rods. No more permanent construction is known to the art.

The Bronzeline grille is securely fastened with brass screws to a heavy gauge steel wall box with steel storm-proof louvres. The wall box is completely galvanized after fabrication.

Air Filter

UNIVERSAL air filters are adhesive impingement type, loaded with a viscous oil compound. They are designed to fit in the fresh air intake of the UNIVERSAL Quiet Operating Unit. In this location the velocity of air over the entire surface of the filter is uniform, with the result that an equal amount of work is imposed thruout its entire area. This location means, in addition, that the air is thoroughly cleaned before it enters any part of the UNIVERSAL Quiet Operating Unit, which results at all times in all operating parts being free from dust and dirt.

Air filters are easily removable thru front of unit.

No Leakage Between Unit and Wall

To insure a tight joint between the UNIVERSAL Quiet Operating Unit and the surface against which it is secured, felt sealing strips are used. These strips are fastened to metal compensators on the back of the unit as indicated in the above photograph.

These metal compensators may be adjusted to compensate for slight irregularities in the surface to which the unit is secured.

UNIVERSAL
Heating & Ventilating Unit

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED

RECIRCULATION

*"From Freezing to Comfort in
less than one hour"*



Quick Heating

The UNIVERSAL aluminum inlet and recirculating damper in combination with the UNIVERSAL recirculating grille makes it possible to heat a standard classroom from 30° to 70° in less than one hour. With room air at 30° UNIVERSAL multifin radiator is capable of raising the temperature of this air to 120°.

A standard 1260 C.F.M. UNIVERSAL Unit is equivalent to over 491 square feet of direct radiation with entering air at 30°. It can readily be seen that with this tremendous reserve heating capacity, *the time required to prepare the room for occupancy is greatly reduced.*

Saves Fuel and Labor

This recirculating feature is saving hundreds of dollars annually in coal consumption with a corresponding saving in labor.

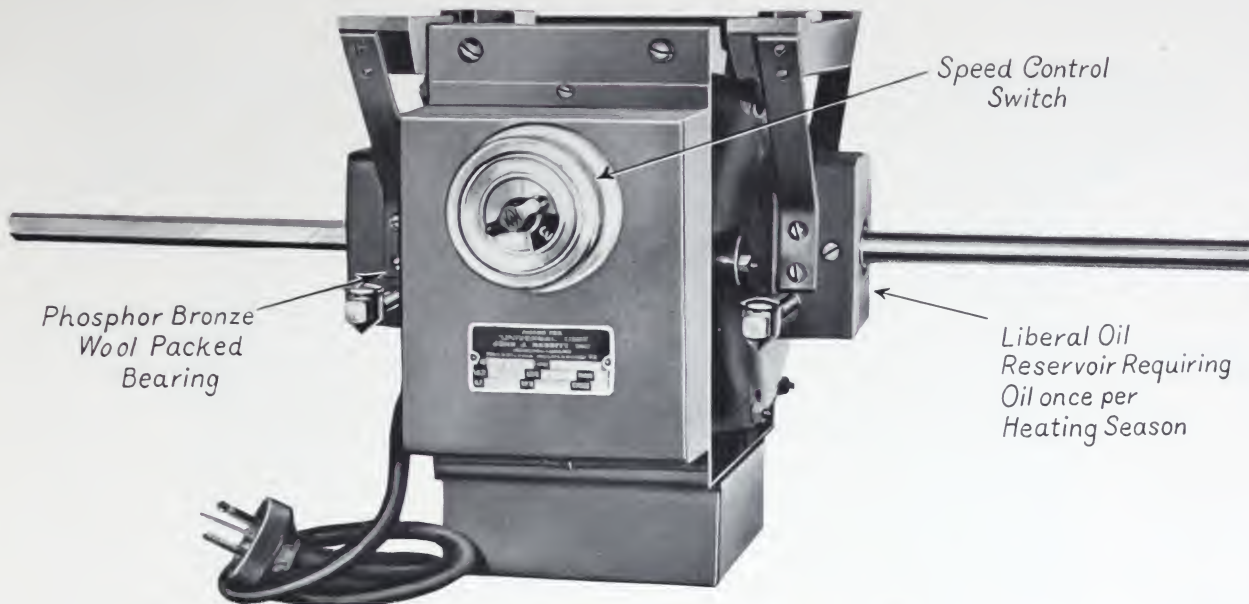
All UNIVERSAL Quiet Operating Units are regularly equipped with this feature unless otherwise specified.

The inlet and recirculating damper can be remotely controlled from pneumatic switch so that when rooms are occupied damper is thrown in position to supply fresh air.

Photograph at top of page 12 shows pneumatic damper motor connected to inlet and recirculating damper.

UNIVERSAL *Heating & Ventilating Unit*

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED



UNIVERSAL CONDENSER, TRANSFORMER, INDUCTION MOTOR

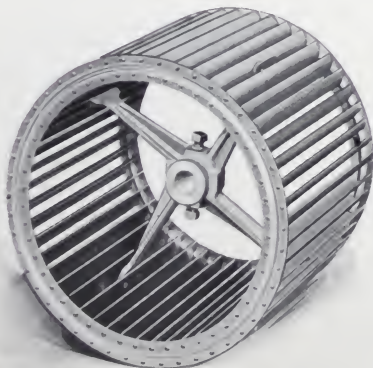
Wound for Any Character of Current UNIVERSAL motors can be furnished for any character of current. All UNIVERSAL A.C. motors are condenser, transformer, induction type.

All Are Variable Speed Autotransformers similar to those used by public utility companies for stepping down voltage are used to regulate UNIVERSAL motor speeds.

A reduction in the number of cubic feet of air delivered results in a corresponding reduction in current consumed.

Three Speed Control First speed for new buildings not pupiled to capacity. Second speed, normal operating speed. Third speed, provides reserve capacity.

Longest Life UNIVERSAL motors are all slow speed, free from all sliding, electrical contact, without starting mechanism, making a long-life motor.



UNIVERSAL FAN "ELECTRIC WELDED"

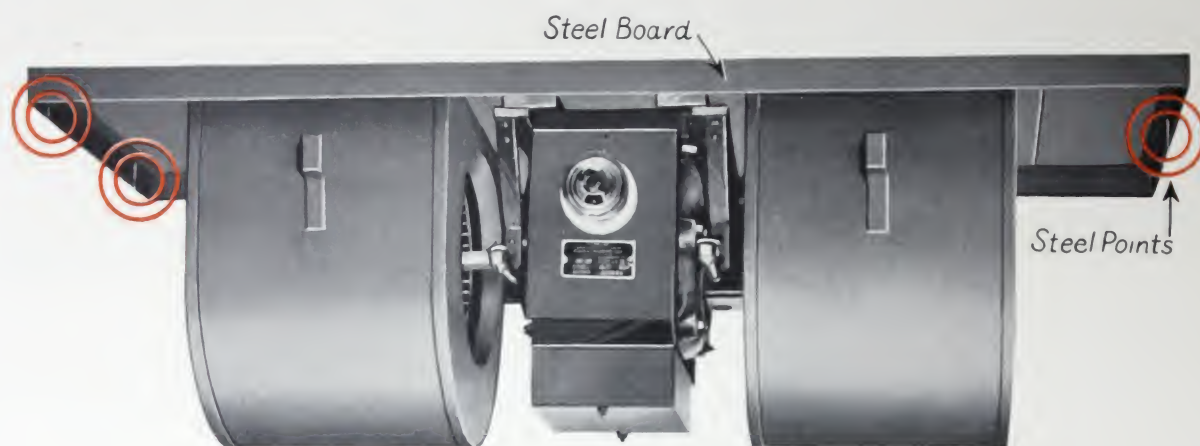
Requires Oiling Once A Heating Season UNIVERSAL motors have oversized bronze bearings with wool-packed oiling system. Oil passes thru fine wool-packing and is filtered before coming in contact with the bronze bearing.

Low Current Consumption The average operating cost of a Series 14-3243 UNIVERSAL Quiet Operating Unit is ½ cent per hour.

Nineteen years of research with motors for this application is responsible for the truly good UNIVERSAL motor.

UNIVERSAL *Heating & Ventilating Unit*

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED



MOTOR AND FAN ASSEMBLY

Three-Point Lead Mounting

Another exclusive UNIVERSAL Quiet Operating feature is the rigid metal to metal contact between the motor and fan assembly and the unit casing. This makes possible the use of alternating current motors with a permanent metal to metal mounting without the use of cork, felt, springs or other materials that disintegrate or change position over a period of years.

In this motor and fan assembly three steel ball points are used as the only contact between the motor and fan assembly and the unit casing.

Perfect Alignment

Three points are used instead of more or less in order to maintain perfect alignment of the motor and fan assembly. This principle is comparable to a three-legged stool, which, when placed on an uneven surface does not wobble, when one with more than three legs would wobble, on the same surface.

Double Inlet Multiblade Fans

The double inlet multiblade fans used in the UNIVERSAL Quiet Operating Unit represent the highest standard in fan design and construction.

That the multiblade type of fan is the most efficient known to the art is an accepted engineering fact.

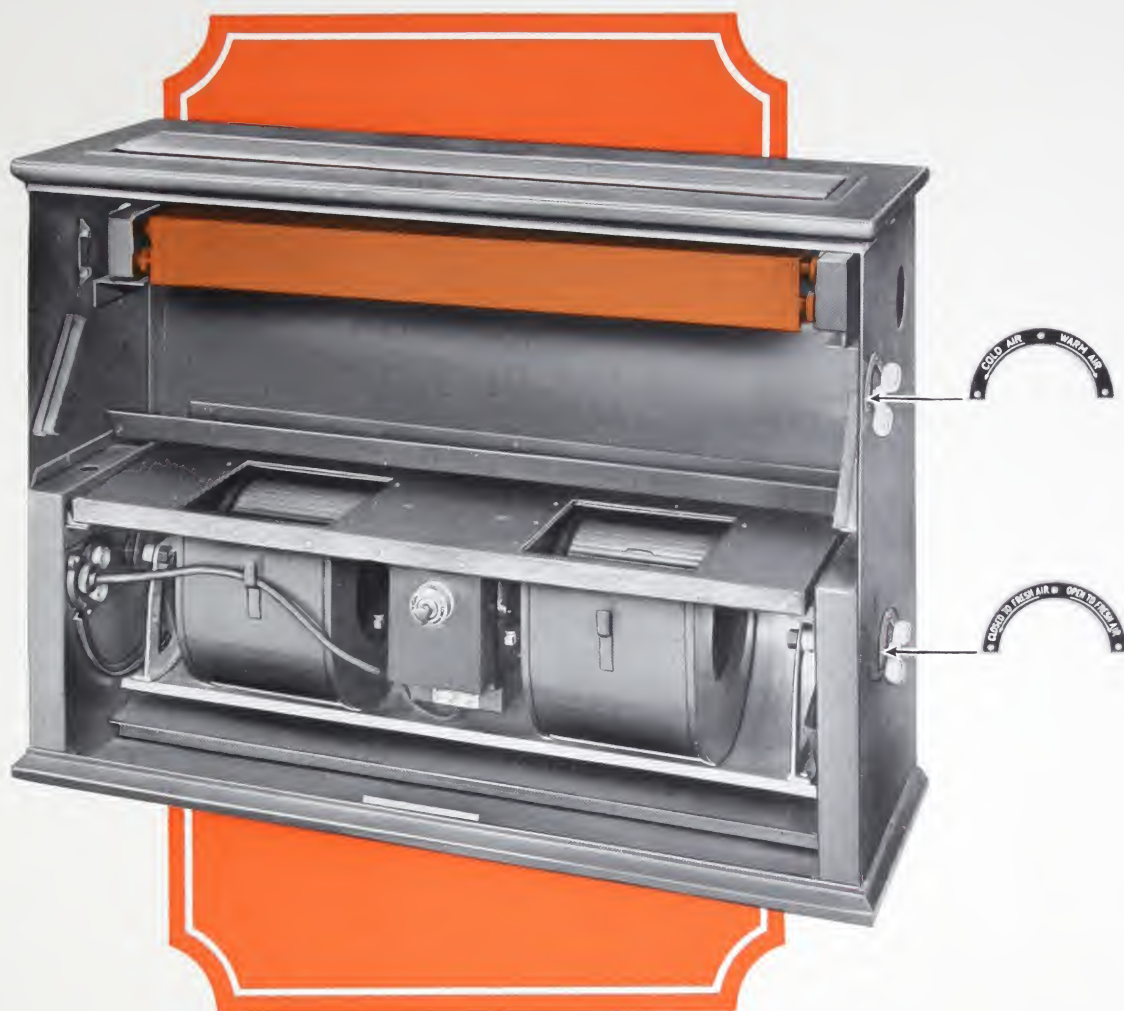
Low Speed—Quiet Operation

All UNIVERSAL Unit fans operate at a very low speed with a correspondingly low velocity at the cut-off point of the fan housing. UNIVERSAL tip speeds and fan outlet velocities are lower by comparison, which is responsible for the UNIVERSAL being a Quiet Operating Unit.



UNIVERSAL
Heating & Ventilating Unit

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED



SERIES 14-3243. TEMPERATURE CONTROL DAMPER REMOVED

Uniform Air Flow Thru Radiator

Because of the compact arrangement of the UNIVERSAL aluminum fresh air inlet and recirculating damper, together with the high efficiency UNIVERSAL multifin radiator, the space between the top of the UNIVERSAL motor and fan assembly and the bottom of the radiator is much greater than that of any other unit.

Uniform Air Flow Over Discharge Grille

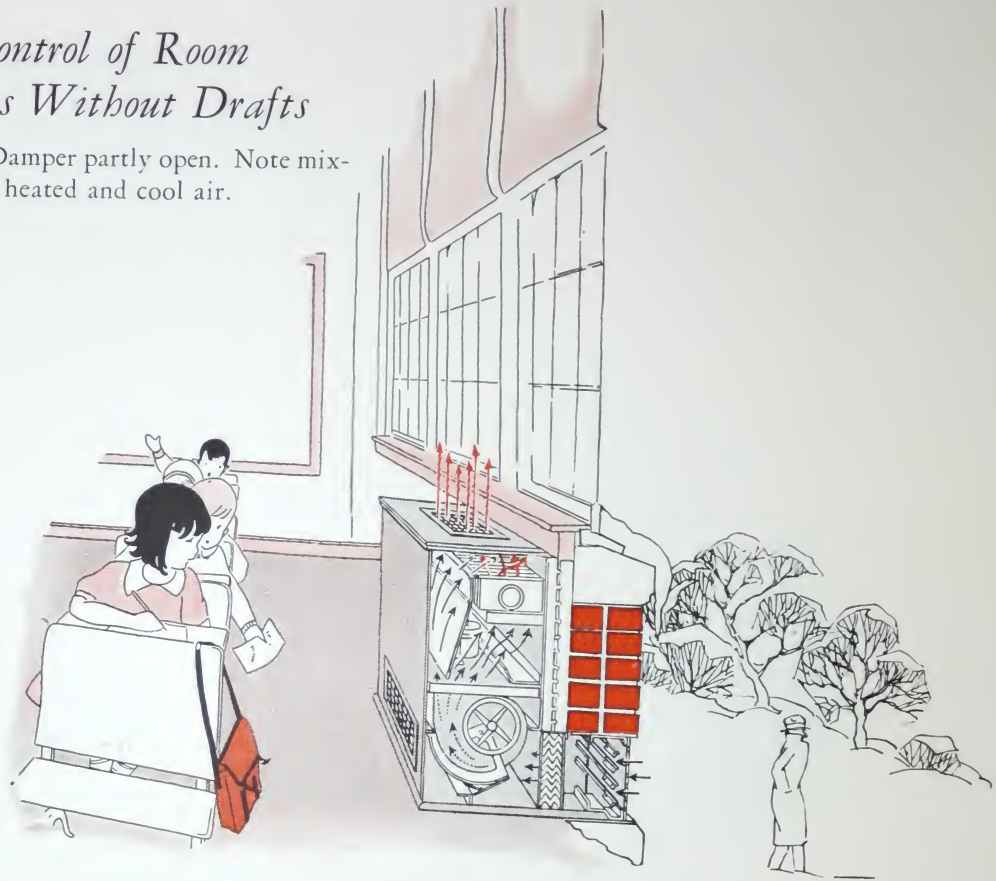
This large freedom of space results in an equal distribution of the air across the full area of the radiator surface, thus imposing an equal amount of work thruout the entire radiator. This feature also results in a uniform air flow over the entire area of the UNIVERSAL discharge grille.

UNIVERSAL
Heating & Ventilating Unit

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED

*Proper Control of Room
Temperatures Without Drafts*

Temperature Control Damper partly open. Note mixing effect of heated and cool air.



Temperature Control Damper

Located at the entrance of the heating and bypass chamber is the aluminum temperature control damper of the UNIVERSAL Quiet Operating Unit. Constructed entirely of aluminum and hinged at one end on a solid brass piano type hinge.

This damper is $9\frac{3}{8}$ " long and operates over an area $8\frac{3}{8}$ " wide, thus providing the largest mixing area available in any unit of this type.

Universal Unit Thoroughly Mixes Air

As the damper is operated across the discharge of the fans to reduce the temperature of the air, part of the air passes thru the radiator and part thru the bypass chamber. Because of the location of the bypass chamber with relation to the discharge grille it is necessary for the cool air to cross the column of heated air, thus thoroughly mixing the two bodies before being discharged into the room.

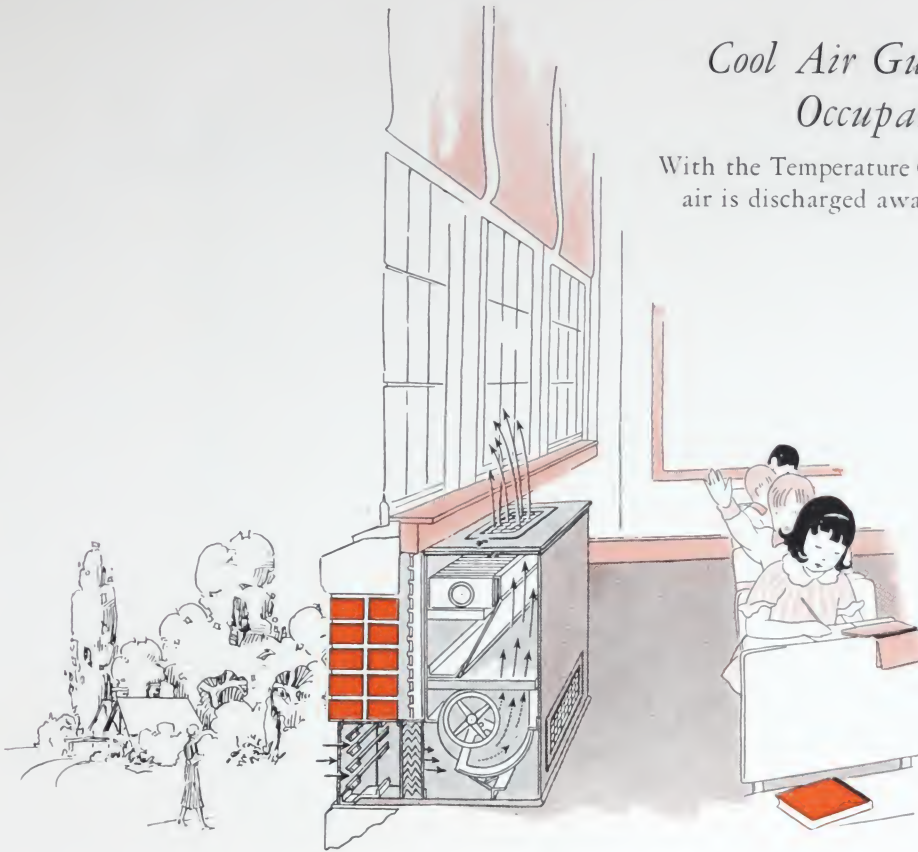
The illustration above clearly indicates how this important requirement is met in the UNIVERSAL Quiet Operating Unit.

UNIVERSAL *Heating & Ventilating Unit*

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED

Cool Air Guided Away from Occupants of Room

With the Temperature Control Damper fully open the air is discharged away from the room occupants.



Cool Air Not Discharged Toward Room Occupants

In every ventilating system there comes a time when air must be introduced into the room at lower than room temperature. It is under this condition that the most difficult problem in unit ventilation with its high velocity discharge is encountered.

The illustration above clearly indicates that when the temperature control damper is in position to bring in air at lower than room temperature, this air is guided *away from* the occupants of the room, an exclusive UNIVERSAL Unit feature, and one which results in proper unit ventilation *without drafts*.

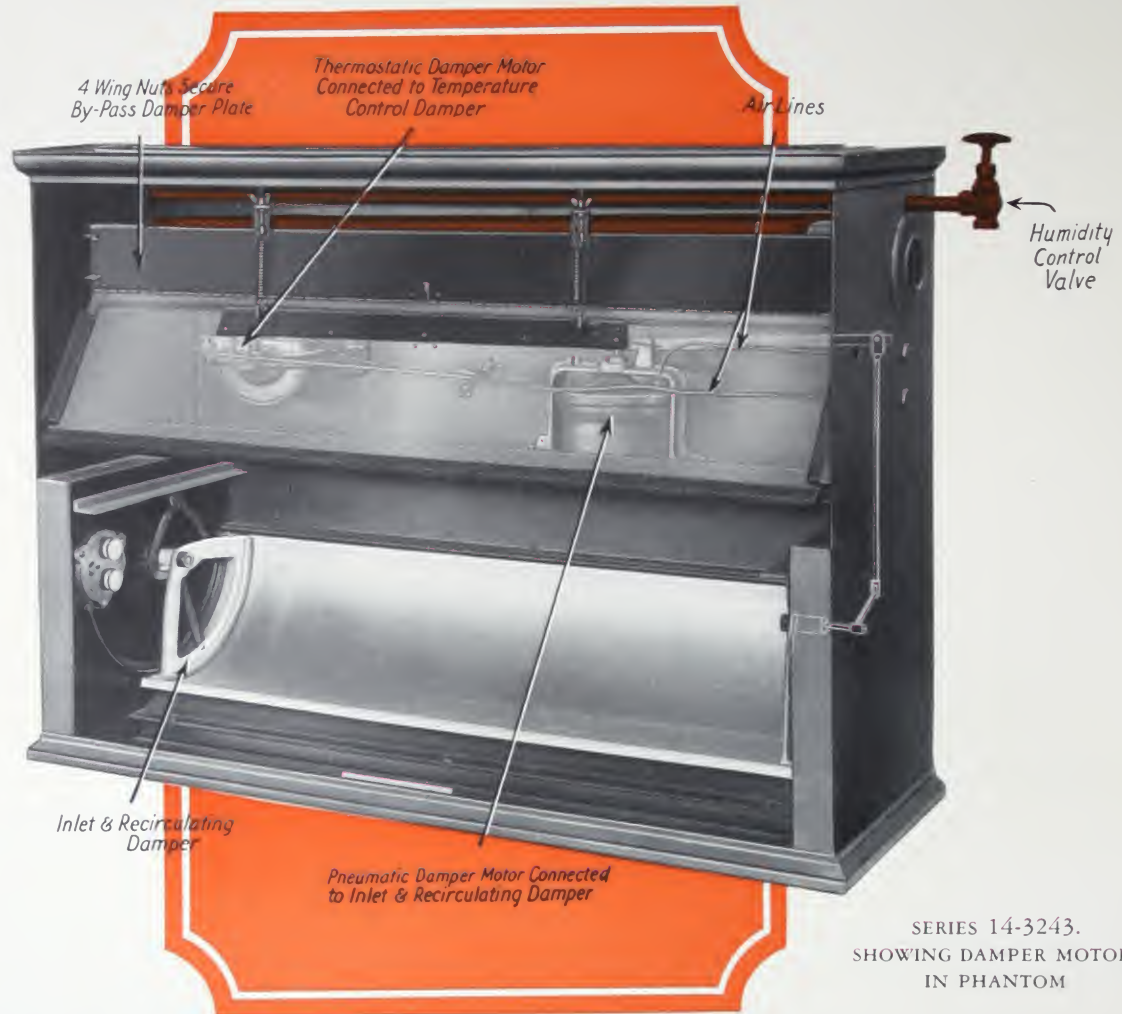
Automatically or Manually Controlled

The temperature control damper can be either automatically or manually operated to regulate the temperature of the air discharge into the classroom. As the damper is operated across the discharge of the fans it causes part or all of the air to pass thru the heating chamber or part or all of the air to pass thru the bypass chamber, depending upon the position of the damper.

The damper is operated in any one of a number of innumerable positions depending upon the temperature requirements of the particular room in which the unit is installed.

UNIVERSAL *Heating & Ventilating Unit*

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED



Control of Dampers

In the above illustration two damper motors are shown, one the thermostatic damper motor for the operation of the aluminum temperature control damper, the other the pneumatic damper motor for control of the aluminum inlet and recirculating damper.

The aluminum inlet and recirculating damper can be so controlled that when the room temperature reaches any desired point this damper opens and admits outside air, thus closing the recirculating grille.

The pneumatic control of the aluminum inlet and recirculating damper can be so arranged that thru the manual operation of an air switch at some remote point the aluminum inlet and recirculating dampers on a given group of units can be opened or closed. The pneumatic control of the inlet and recirculating dampers is generally a part of the automatic control system.

Humidifier

Where it is desired to add to the air a variable amount of humidity, a perforated brass humidifier with control valve is supplied with each unit. This humidifier is connected to the steam supply on the unit side of the control valve. The humidifier is only supplied where specified.

UNIVERSAL *Heating & Ventilating Unit*

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED

This Action Eliminates Drafts

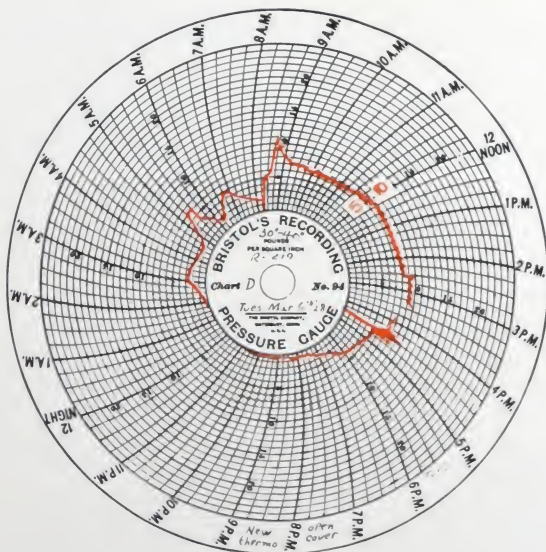
On Chart No. 1 below, you can visualize the movement of the UNIVERSAL aluminum temperature control damper over a period of a full school day. From 9.00 A. M. until 3.30 P. M. the UNIVERSAL aluminum temperature control damper under actual operating conditions moved gradually in an intermediate position, requiring between six and ten pounds of air pressure, without at any time passing in either extreme position.

Recording Chart No. 2 indicates the room temperature as maintained by the UNIVERSAL temperature control damper. It is interesting to see that this temperature did not vary more than one degree above or below 70 degrees over the full six and one-half hour period.

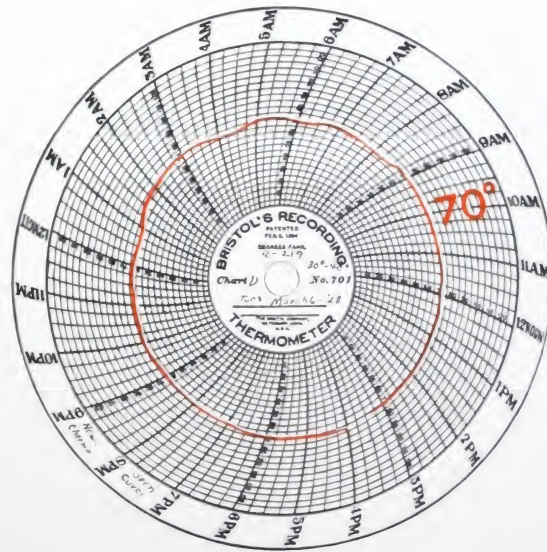
The requirement of controlling room temperatures without creating drafts is fully met in the UNIVERSAL Quiet Operating Units described herein.

Prevents Overheating

When automatic temperature regulation is used it is recommended that an intermediate acting thermostat be connected with pneumatic damper motor to the temperature control damper of the UNIVERSAL Unit so that on a rising room temperature the thermostat will function to operate the damper with intermediate action. When the temperature of the room reaches 70 degrees the temperature control damper should be fully open. If there is a further rise in room temperature the thermostatic valve on the steam supply to the radiator in the UNIVERSAL Unit should close with positive action, thus preventing all possibility of overheating.



NO. 1



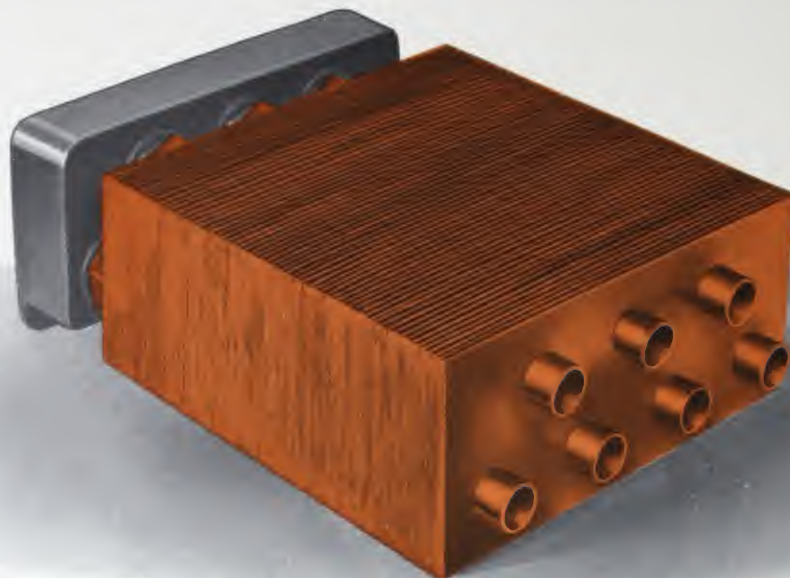
NO. 2

Chart No. 1 indicates the air pressure on the thermostatic damper motor in a standard UNIVERSAL Unit.
Chart No. 2 indicates the room temperature.

The duration of the test was from 9.00 A.M. to 3.30 P.M. Close observation of the charts will indicate that the test was conducted on March 6, 1928, with outside temperature ranging from 30 to 40 degrees. These records were taken under actual operating conditions in a 40-pupil room, where the UNIVERSAL Unit system had been in operation for a period of six months. The test was conducted by the Board of Education unknown to the manufacturers.

UNIVERSAL
Heating & Ventilating Unit

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED



SECTION OF UNIVERSAL UNIT RADIATOR

Copper Tube Radiator

The copper tube radiator of the UNIVERSAL Quiet Operating Unit is constructed with $\frac{3}{4}$ " diameter seamless drawn copper tubes of uniform wall thickness.

The relative heat conductivity of Copper is 89, Aluminum 48, Brass 30, Cast Iron 12.

The entire air heating element of the UNIVERSAL radiator is Copper, the most efficient metal used in radiator construction.

Real Thermal Contact

These tubes and the cast iron headers with their ground joint unions between the tubes and the headers form the steam enclosing space. Over these tubes copper plates with holes ten thousandths of an inch smaller in diameter than the outside diameter of the tube, are forced at 3200 pounds pressure, making positive thermal contact between the tubes and the plates.

No Soldered, Welded or Packed Joints

Brass couplings are used in making ground joint connections between tubes and headers so that there are no soldered, welded, packed, or lead joints of any kind used in the radiator construction.

Rugged and capable of operating on any working pressure, this radiator will stand an 800 pound hydraulic test.

The UNIVERSAL copper tube radiator will outlast the building. It is truly an everlasting radiator.

UNIVERSAL
Heating & Ventilating Unit

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED



COMPONENT PARTS OF
UNIVERSAL UNIT RADIATOR

Will Stand Freezing Without Breaking

With ample provision for draining thru the use of a heavy boss on the feed casting, and with steam and return connections well below the lowest copper tubes, the possibility of condensate becoming entrained in the radiator is remote.

With each copper plate supporting the copper tubes, the radiator will stand freezing without breaking, and is designed to meet every requirement of this application.

Will Heat Most Rooms Without Direct Radiation

So rapid is the rate of heat transfer from the copper tubes to the copper plates, and so large is the amount of surface which can be used in the compact arrangement of this radiator, it is possible to deliver the air at a sufficiently high temperature to heat and ventilate the average classroom with the UNIVERSAL ventilating unit alone.

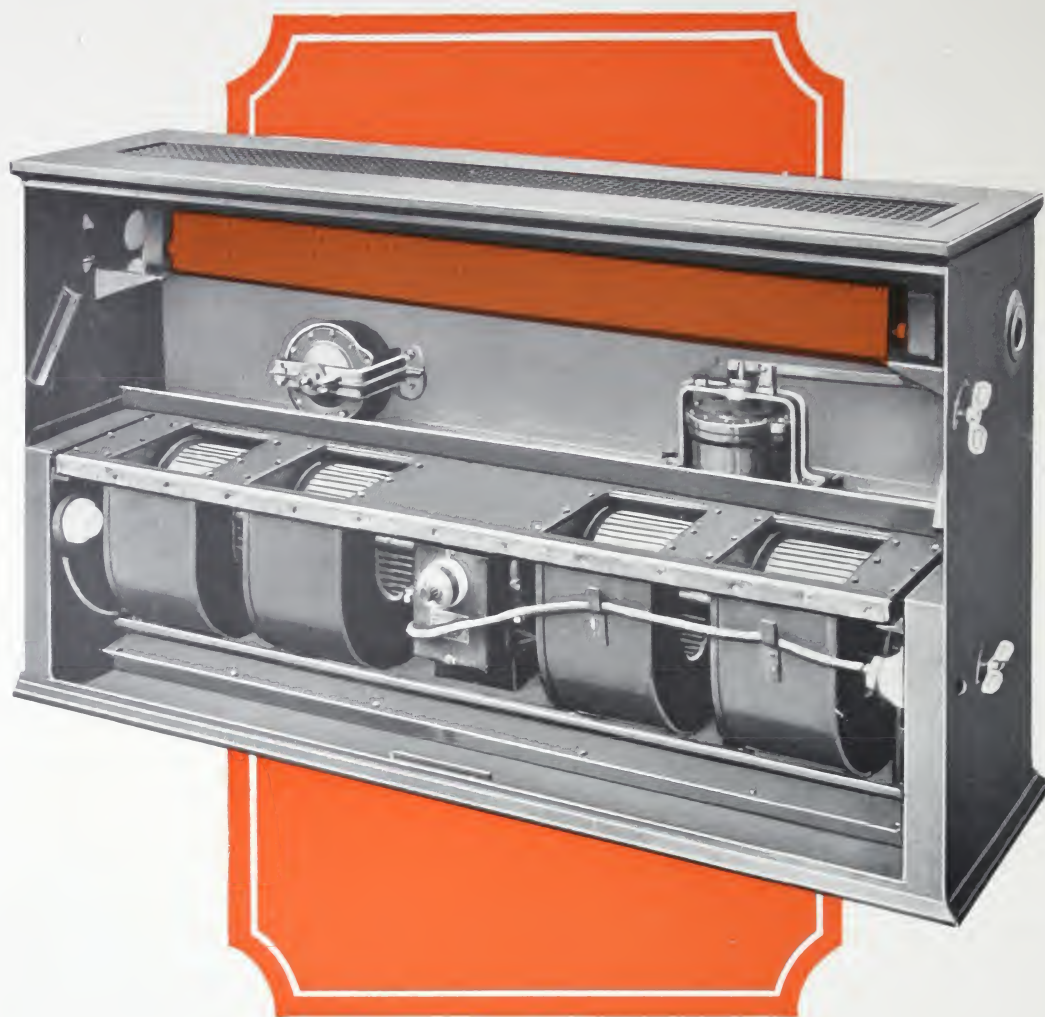
In cases where the total B.T.U. required for both heating and ventilating a room is within the B.T.U. capacity as given in the tables of capacities we advocate the use of the UNIVERSAL Unit without direct radiation. Under such an arrangement it is necessary to ventilate in order to heat; the initial installation cost is lower and because of the recirculating feature, the operating cost is no higher.



COMPLETE UNIVERSAL
UNIT RADIATOR

UNIVERSAL
Heating & Ventilating Unit

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED



SERIES 14-3256-15

Two Sizes of Radiators

Each UNIVERSAL Unit is manufactured with a radiator of two different sizes; one the blast radiator large enough to take care of the average room without direct radiation, and the other large enough to heat the air to approximately fifteen degrees above room temperature as indicated in the Table of Capacities.

Important to Select Proper Size

In cases where direct radiation is provided, care should be used to indicate that the small capacity UNIVERSAL Unit radiator is desired, for more harm comes from overheating than from any other cause. Care should be used in determining the size capacity radiator to be used, as it has a vital effect on the temperature regulation.

UNIVERSAL
Heating & Ventilating Unit

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED



SERIES 14-3256-15

Attractive in Appearance

FINISHED in olive green Duco, the same process as used for automobile body work, the UNIVERSAL Quiet Operating Unit is attractive in appearance, in addition to being of excellent design. The recirculating and inlet grilles are in harmony with the cabinet construction, pleasing to the eye and very substantial.

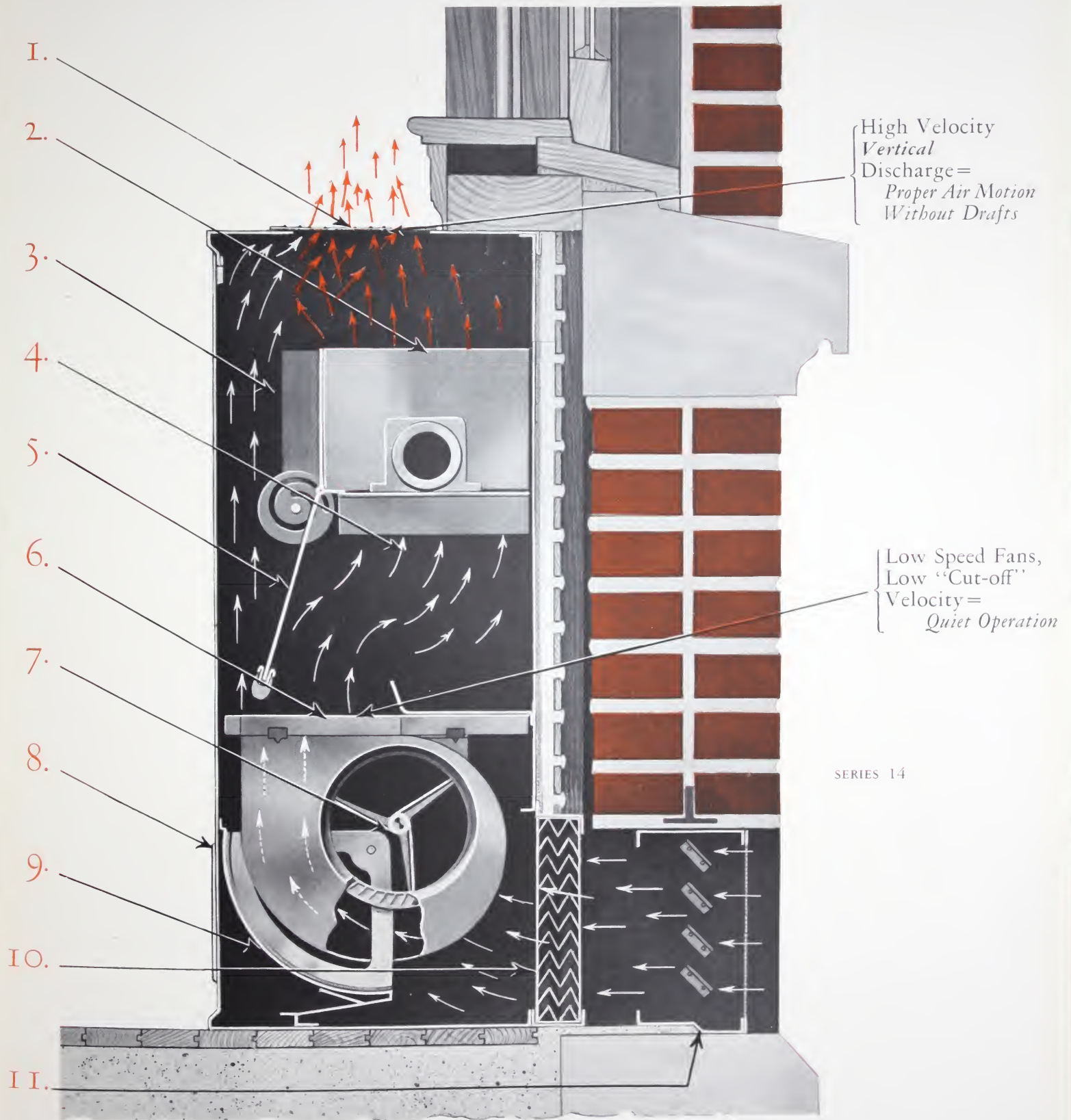
Constructed of Heavy Steel

The UNIVERSAL cabinet is constructed of No. 14 gauge cold rolled, stretcher levelled, first grade furniture stock steel.

Eleven Points of Superiority

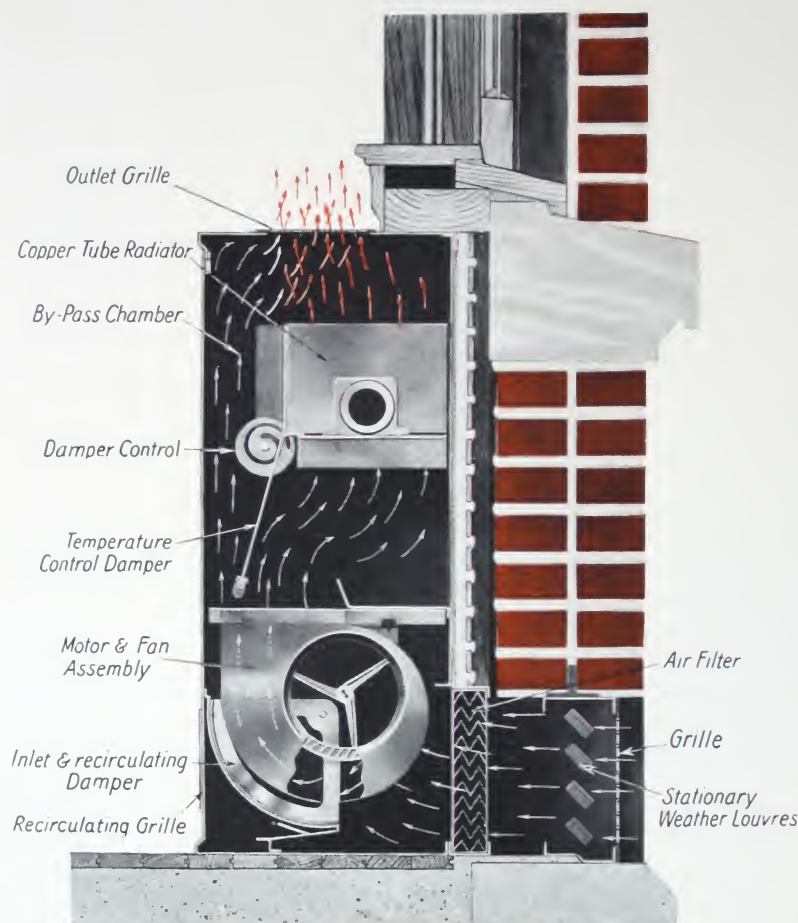
1. High velocity aluminum streamline outlet grille, heavy in construction, neat in design. Uniform air movement over entire area. }
2. Multifin radiator, entire air heating element of copper. Rugged, capable of standing 125 pounds pressure, free from soldered, brazed, welded or packed joints, a radiator that will outlast the building. }
3. Bypass chamber parallel to heating chamber. So located to guide column of cool air across currents of warm air when mixing, and guide cool air away from room occupants when completely bypassing. }
4. Large space permits equal distribution of air, resulting in uniform heating over entire area of radiator. }
5. Aluminum temperature control damper operating over wide area results in fine control of temperature and graduated action of damper. Operates on solid brass hinge. }
6. Variable speed motor mounted on heavy steel board with three steel ball points of contact between board and unit casing results in rigid metal to metal contact, responsible for the enduring use of alternating current motors. }
7. Sirocco type multiblade, double inlet fans—no greater efficiency known. Low velocity at cut-off point and low tip speed results in quiet operation. }
8. Recirculating grille near floor line results in quick heating, requiring less than one hour to warm average classroom from 30° to 70°. Air circulates through unit by gravity when fans are not being operated. }
9. One-piece aluminum inlet and recirculating damper with felt damper stops reduce possibility of air leakage by reducing number of parts. It is possible to recirculate in a unit only 14 inches wide. }
10. Air filter cleans air before entering unit. Velocity of air uniform at this point, imposing equal amount of work thruout entire area. Requires less frequent cleaning. Easily removable thru front of cabinet. }
11. Bronzeline fresh air inlet grille, stationary storm-proof louvres in heavy gauge galvanized iron wall box. UNIVERSAL quality starts with the bronze inlet grille and the same standard is maintained thruout the entire construction. }

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED



UNIVERSAL
Heating & Ventilating Unit

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED



SERIES 14

Only 32 Inches High

WITH capacities ranging from 450 to 1560 cubic feet of air per minute, and with radiator large enough to heat and ventilate the average classroom without the use of any supplementary radiation, the UNIVERSAL Unit 32" high, 14" deep, 34", 43" and 56" long is the most compact of all units of this type.

The compactness of the UNIVERSAL Quiet Operating Unit is due to a great extent to the high efficiency of the "everlasting" copper tube radiator described on pages 14, 15 and 16.

The moving parts in the UNIVERSAL Quiet Operating Unit are fewer than in any other unit of its type.

UNIVERSAL Units are designed to meet the most exacting demands of the schoolhouse architect.

This UNIVERSAL Unit can be recessed 4" as shown.

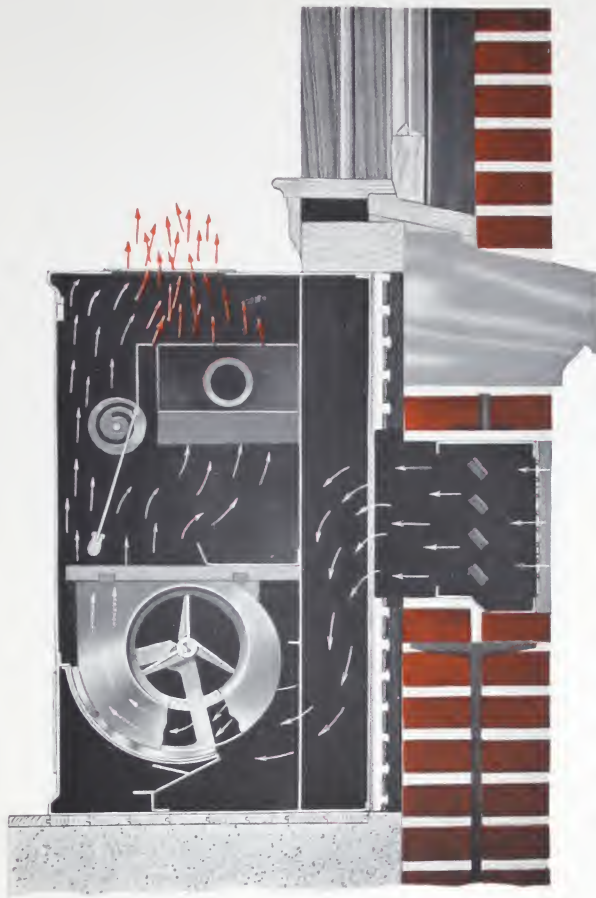
Air filters are furnished only when specified.

Capacity tables, pages 27, 28 and 29. Dimensions, page 32.

UNIVERSAL
Heating & Ventilating Unit

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED

SERIES 18



Meets All Structural Conditions

THE most generally used UNIVERSAL Unit is the one illustrated on page 20, with the wall box and grille located at the floor line. This unit possesses all the advantages of all other types of UNIVERSAL Units, and has the additional feature of being only fourteen inches wide. It is safe to say that approximately eighty per cent of all UNIVERSAL Units used are of this type, and where it is adaptable to the building construction its use is recommended by the manufacturers.

Structural conditions such as indicated in the illustration above are sometimes encountered, and the 18" wide UNIVERSAL Unit is then used to meet conditions of this kind.

With this unit the wall box and grille can be any height from the floor line to the top of the unit. This unit, too, is only 32" high, and can be recessed to a depth of 8 inches.

Capacity tables, pages 27, 28 and 29. Dimensions, page 32.

UNIVERSAL
Heating & Ventilating Unit

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED



SERIES W-18.
WINDOW INLET

Installed in Old Buildings, Too

No other system of ventilation possesses as many advantages for use in old buildings as the Unit system. The UNIVERSAL Quiet Operating Unit pictured above is so designed that the fresh air inlet can be over top of the window sill, thus eliminating all cutting of walls. This unit is manufactured in the same capacities as the 14" wide unit.

Where double-hung sash is used, no alteration to the sash is necessary, as this unit does not interfere with the usual operation of the sash.

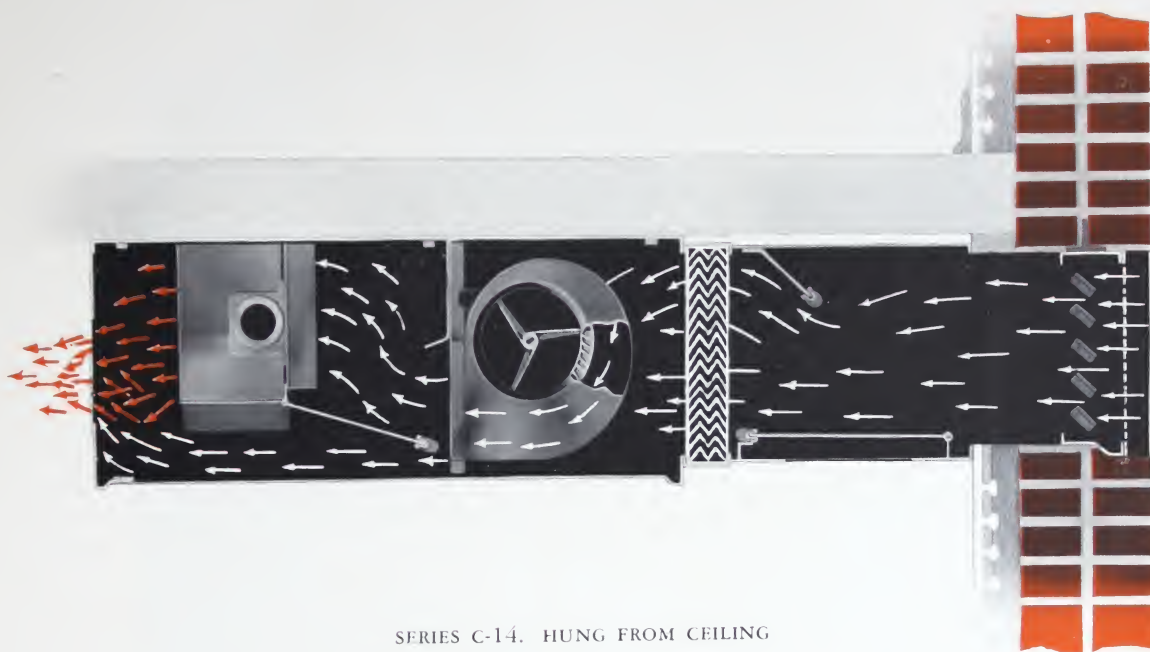
Where pivoted or swinging sash is used, the lower section, to a minimum height of 8 inches, must be made stationary. The height must be sufficient to provide ample area, and where required this can be increased to any height up to and including 12". Area shall be based on 600 ft. velocity.

Where window sills are high, metal bases are furnished as part of the unit equipment. When air filters are desired they are located in the fresh air inlet, which must then be not less than 10½" high.

Capacity tables, pages 27, 28 and 29. Dimensions, page 32.

UNIVERSAL
Heating & Ventilating Unit

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED



SERIES C-14. HUNG FROM CEILING

For Basement or Ground Floor Rooms

IN some cases it is necessary to hang the unit horizontally at the ceiling in order to meet problems involving the water line of the boiler in ground floor or basement rooms. UNIVERSAL Quiet Operating ceiling units are designed to meet this and other conditions requiring a horizontal discharge.

In cases of rooms having ceiling heights in excess of ten feet, a deflector is supplied on the discharge outlet to guide the air downward, when specified. This type unit is recommended for use only where it is impossible to use a Series 14 or Series 18 unit, for it does not embody the high velocity *vertical* discharge feature. Fresh air inlet connection from this unit can be made to the upper section of a window in very much the same manner as illustrated for the Series W-18 unit, on page 22.

When manually controlled the inlet and recirculating damper and the temperature control damper are both provided with chain control, making it convenient to operate the dampers from below.

Built in same capacities as Series No. 14, pages 27, 28 and 29. Dimensions, page 34.

UNIVERSAL
Heating & Ventilating Unit

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED



SERIES 22

For Larger Rooms

For rooms other than standard classrooms specify UNIVERSAL Units Series No. 22. This series is constructed in capacities from 2000 C.F.M. to 4000 C.F.M.; temperature rises for various C.F.M. shown on page 30, dimensions, page 33.

High Standard of Quality

The same high standard of quality incorporated into the smaller capacity units is maintained in the construction of the larger units. They are constructed of No. 11 and 14 gauge, stretcher levelled, first grade furniture stock steel, finished in olive green Duco.

Same Type Motor and Fan

UNIVERSAL condenser, transformer, induction, variable speed motors are also used in these larger units. Motors are provided with three speed switch.

UNIVERSAL
Heating & Ventilating Unit

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED



SERIES 22-4856

Series numbers 22-4843-20 and C-22-4843-20, are each equipped with one slow speed motor operating two fans.

To provide proper distribution and maintain uniform velocities thruout the cabinet as well as to facilitate handling, Series numbers 22-4856 and 66, as well as Series numbers C-22-4856 and 66, are each equipped with two motor and fan assemblies, each motor operating two fans.

Quiet Operating

The large capacity UNIVERSAL Units are designed especially for use in auditoriums, study halls or other large rooms where quiet operation is essential.

Caution

Where galvanized iron ducts are connected to the inlet or outlet, proper allowance must be made for drop in capacities. (See explanation of table of capacities, page 26.)

UNIVERSAL
Heating & Ventilating Unit

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED

Capacities

Eighteen Cabinet Sizes

THE UNIVERSAL Quiet Operating Units covered by this publication are Type A, manufactured in eighteen different cabinet sizes, with nine different air deliveries, as indicated in the table of capacities, and shown by dimensions on following pages.

High and Low Temperature Radiators

Two different radiator sizes are available for each cabinet size. The figures indicated in red are for the blast system where high outlet temperatures are desired, or in cases where no direct radiation is provided in the classrooms. The figures in black are for cases where the unit is being used in combination with direct radiation.

The capacities and data indicated in the Table of Capacities apply to all UNIVERSAL Quiet Operating Units described in this publication.

Method of Rating

Heating capacities of UNIVERSAL Quiet Operating Units given in equivalent square feet of direct radiation (E.D.R.). E.D.R. is computed on basis of the average temperature rise over the full face of the discharge grille, and the amount of air delivered is measured by the anemometer at the final temperature.

The factors used for these computations are on a basis of the pounds of condensate per hour, being equal to cubic feet per hour multiplied by the temperature rise, specific heat, and the weight of air at the final temperature divided by the latent heat of evaporation.

Tables are based on steam at 218 degrees Fahrenheit.

All air deliveries are based on heated air measured with standard 4" anemometer, to be used as prescribed in the code of the American Society of Heating and Ventilating Engineers, with instrument held 2" above the outlet grille, and the volume being the product of the average velocity times gross area.

Caution

The characteristics of Quiet Operating UNIVERSAL Units are such that the addition of duct work causes variable reductions of capacity. Our Sales Engineers should be consulted for capacities when duct work is added.

Capacities as given herein are based upon UNIVERSAL Quiet Operating Units without air filters.

With filters air delivery drops off from 8% to 15%, depending upon condition of filters.

With UNIVERSAL motor operating at full speed the capacities as shown are produced with filters in place.

UNIVERSAL *Heating & Ventilating Unit*

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED

TABLE OF CAPACITIES

450 C.F.M.										
SERIES 14-3234-4½ ALSO 18-3234-4½ ALSO C-14-3234-4½ ALSO W18-3234-4½ ONE MOTOR 400 R.P.M. TWO FANS 5" WIDE 7" DIAMETER. PERIPHERAL SPEED 733 FT. PER MIN.										
Inlet Temperature Degrees Fahrenheit	-30°	-20°	-10°	0°	10°	20°	30°	40°	50°	60°
Outlet Temperature Degrees Fahrenheit	103° 81°	108° 86°	113° 91°	120° 98°	126° 104°	131° 109°	137° 115°	143° 121°	149° 127°	155° 133°
Total Heat Equivalent Direct Radiation (E.D.R.)	253 220	241 208	230 197	222 188	212 178	201 168	193 158	183 150	175 141	166 132
Heat Required to Raise Temp. of Air to 70° in E.D.R.	202 202	182 182	162 162	142 142	121 121	101 101	81 81	61 61	40 40	20 20
Surplus Heat E.D.R.	51 18	59 26	68 35	80 46	91 57	100 67	112 77	122 89	135 101	146 112
600 C.F.M.										
SERIES 14-3234-6 ALSO 18-3234-6 ALSO C-14-3234-6 ALSO W18-3234-6 ONE MOTOR 520 R.P.M. TWO FANS 5" WIDE 7" DIAMETER. PERIPHERAL SPEED 953 FT. PER MIN.										
Inlet Temperature Degrees Fahrenheit	-30°	-20°	-10°	0°	10°	20°	30°	40°	50°	60°
Outlet Temperature Degrees Fahrenheit	98° 73°	103° 79°	108° 84°	112° 90°	118° 96°	124° 102°	130° 108°	136° 114°	142° 120°	148° 126°
Total Heat Equivalent Direct Radiation (E.D.R.)	328 277	313 262	297 247	280 234	267 221	254 208	242 197	230 185	218 173	207 161
Heat Required to Raise Temp. of Air to 70° in E.D.R.	270 270	243 243	216 216	189 189	162 162	135 135	108 108	81 81	54 54	27 27
Surplus Heat E.D.R.	58 7	70 19	81 31	91 45	105 59	119 73	134 89	149 104	164 119	180 134

DEFINITION OF NOMENCLATURE IN TABLE OF CAPACITIES

- (1) The use of a suffix number in series designates a unit with a capacity range as indicated in the Tables. Variation in capacity of any unit is obtained thru speed control on motor, thus where the suffix number 6 is used the capacity of the unit is 451 to 600 C.F.M.
- (2) The use of prefix letter "W" indicates a window inlet arrangement.
- (3) The use of prefix letter "C" indicates a ceiling unit with either window or wall box inlet.
- (4) Series 14-3234-6 indicates a unit 14 inches wide, 32 inches high, 34 inches long, with a capacity range from 451 C.F.M. to 600 C.F.M.
- (5) Red figures indicate high temperature—black, low temperature radiators.
- (6) To convert equivalent direct radiation (E.D.R.) as given above to B.T.U. multiply by 240.
- (7) To obtain pounds of condensate divide equivalent direct radiation (E.D.R.) by 4.
- (8) UNIVERSAL units covered by this publication are identified by nomenclature given above in addition to being known as Type A.

UNIVERSAL

Heating & Ventilating Unit

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED

TABLE OF CAPACITIES

750 C.F.M.										
SERIES 14-3234-7½ ALSO 18-3234-7½ ALSO C-14-3234-7½ ALSO W18-3234-7½ ONE MOTOR 650 R.P.M. TWO FANS 5" WIDE 7" DIAMETER. PERIPHERAL SPEED 1190 FT. PER MIN.										
Inlet Temperature Degrees Fahrenheit	-30°	-20°	-10°	0°	10°	20°	30°	40°	50°	60°
Outlet Temperature Degrees Fahrenheit	92° 70°	97° 75°	102° 80°	107° 85°	114° 92°	120° 98°	126° 104°	132° 110°	138° 116°	144° 122°
Total Heat Equivalent Direct Radiation (E.D.R.)	394 337	375 318	356 298	337 279	324 266	308 250	293 234	278 219	263 205	248 191
Heat Required To Raise Temp. of Air to 70° in E.D.R.	337 337	304 304	270 270	236 236	202 202	169 169	135 135	101 101	67 67	34 34
Surplus Heat E.D.R.	57 0	71 14	86 28	101 43	122 64	139 81	158 99	177 118	196 138	214 157
1000 C.F.M.										
SERIES 14-3243-10 ALSO 18-3243-10 ALSO C-14-3243-10 ALSO W18-3243-10 ONE MOTOR 640 R.P.M. TWO FANS 6" WIDE 7" DIAMETER. PERIPHERAL SPEED 1175 FT. PER MIN.										
Inlet Temperature Degrees Fahrenheit	-30°	-20°	-10°	0°	10°	20°	30°	40°	50°	60°
Outlet Temperature Degrees Fahrenheit	102° 80°	107° 85°	112° 90°	119° 97°	125° 103°	131° 109°	137° 115°	143° 121°	149° 127°	155° 133°
Total Heat Equivalent Direct Radiation (E.D.R.)	560 486	534 459	509 433	491 416	468 394	448 373	428 352	406 332	388 313	368 293
Heat Required to Raise Temp. of Air to 70° in E.D.R.	450 450	405 405	360 360	315 315	270 270	224 224	180 180	135 135	90 90	45 45
Surplus Heat E.D.R.	110 36	129 38	149 65	176 101	198 124	240 163	248 172	271 197	298 223	323 248

DEFINITION OF NOMENCLATURE IN TABLE OF CAPACITIES

- (1) The use of a suffix number in series designates a unit with a capacity range as indicated in the Tables. Variation in capacity of any unit is obtained thru speed control on motor, thus where the suffix number 10 is used the capacity of the unit is 751 to 1000 C.F.M.
- (2) The use of prefix letter "W" indicates a window inlet arrangement.
- (3) The use of prefix letter "C" indicates a ceiling unit with either window or wall box inlet.
- (4) Series 14-3243-10 indicates a unit 14 inches wide, 32 inches high, 43 inches long, with a capacity range from 751 C.F.M. to 1000 C.F.M.
- (5) Red figures indicate high temperature—black, low temperature radiators.
- (6) To convert equivalent direct radiation (E.D.R.) as given above to B.T.U. multiply by 240.
- (7) To obtain pounds of condensate divide equivalent direct radiation (E.D.R.) by 4.
- (8) UNIVERSAL units covered by this publication are identified by nomenclature given above in addition to being known as Type A.

UNIVERSAL Heating & Ventilating Unit

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED

TABLE OF CAPACITIES

1260 C.F.M.										
SERIES 14-3243-12 ALSO 18-3243-12 ALSO C-14-3243-12 ALSO W18-3243-12 ONE MOTOR 720 R.P.M. TWO FANS 6" WIDE 7" DIAMETER. PERIPHERAL SPEED 1320 FT. PER MIN.										
Inlet Temperature Degrees Fahrenheit	-30°	-20°	-10°	0°	10°	20°	30°	40°	50°	60°
Outlet Temperature Degrees Fahrenheit	93° 70°	98° 76°	103° 81°	109° 87°	115° 93°	120° 98°	126° 104°	132° 110°	138° 116°	144° 122°
Total Heat Equivalent Direct Radiation (E.D.R.)	668 567	634 538	602 505	575 477	548 440	518 419	491 394	466 368	442 344	417 320
Heat Required to Raise Temp. of Air to 70° in E.D.R.	567 567	510 510	454 454	397 397	340 340	283 283	227 227	170 170	113 113	57 57
Surplus Heat E.D.R.	101 0	124 28	148 51	178 80	208 100	235 136	264 167	296 198	329 231	360 263
1560 C.F.M.										
SERIES 14-3256-15 ALSO 18-3256-15 ALSO C-14-3256-15 ALSO W18-3256-15 ONE MOTOR 700 R.P.M. FOUR FANS 5" WIDE 7" DIAMETER. PERIPHERAL SPEED 1285 FT. PER MIN.										
Inlet Temperature Degrees Fahrenheit	-30°	-20°	-10°	0°	10°	20°	30°	40°	50°	60°
Outlet Temperature Degrees Fahrenheit	90° 68°	95° 73°	100° 78°	106° 84°	112° 90°	119° 97°	125° 103°	131° 109°	137° 115°	143° 121°
Total Heat Equivalent Direct Radiation (E.D.R.)	811 691	770 649	730 609	696 574	664 540	636 514	604 482	572 451	541 420	512 390
Heat Required to Raise Temp. of Air to 70° in E.D.R.	702 702	632 632	562 562	491 491	421 421	351 351	281 281	211 211	140 140	70 70
Surplus Heat E.D.R.	109 -11	138 17	168 47	205 83	243 119	215 163	323 201	361 240	401 280	442 320

DEFINITION OF NOMENCLATURE IN TABLE OF CAPACITIES

- (1) The use of a suffix number in series designates a unit with a capacity range as indicated in the Tables. Variation in capacity of any unit is obtained thru speed control on motor, thus where the suffix number 15 is used the capacity of the unit is 1261 to 1560 C.F.M.
- (2) The use of prefix letter "W" indicates a window inlet arrangement.
- (3) The use of prefix letter "C" indicates a ceiling unit with either window or wall box inlet.
- (4) Series 14-3256-15 indicates a unit 14 inches wide, 32 inches high, 56 inches long, with a capacity range from 1261 C.F.M. to 1560 C.F.M.
- (5) Red figures indicate high temperature—black, low temperature radiators.
- (6) To convert equivalent direct radiation (E.D.R.) as given above to B.T.U. multiply by 240
- (7) To obtain pounds of condensate divide equivalent direct radiation (E.D.R.) by 4.
- (8) UNIVERSAL units covered by this publication are identified by nomenclature given above in addition to being known as Type A.

UNIVERSAL

Heating & Ventilating Unit

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED

TABLE OF CAPACITIES

2000 C.F.M.										
SERIES 22-4843-20 ALSO 30-4843-20 ALSO C-22-4843-20 ALSO W30-4843-20										
ONE MOTOR 720 R.P.M. TWO FANS 7" WIDE 11" DIAMETER. PERIPHERAL SPEED 2080 FT. PER MIN.										
Inlet Temperature Degrees Fahrenheit	-30°	-20°	-10°	0°	10°	20°	30°	40°	50°	60°
Outlet Temperature Degrees Fahrenheit	72° 54°	78° 60°	84° 66°	90° 72°	96° 78°	102° 84°	108° 90°	114° 96°	120° 102°	126° 108°
Total Heat Equivalent Direct Radiation (E.D.R.)	914 779	869 733	824 689	780 645	737 602	696 561	655 520	614 480	575 441	537 403
Heat Required To Raise Temp. of Air to 70° in E.D.R.	900 900	810 810	720 720	630 630	540 540	450 450	360 360	270 270	180 180	90 90
Surplus Heat E.D.R.	14 -221	59 -77	104 -31	150 15	197 62	246 111	295 160	344 210	395 261	447 313
3000 C.F.M.										
SERIES 22-4856-30 ALSO 30-4856-30 ALSO C-22-4856-30 ALSO W30-4856-30										
TWO MOTORS 720 R.P.M. FOUR FANS 5" WIDE 11" DIAMETER. PERIPHERAL SPEED 2080 FT. PER MIN.										
Inlet Temperature Degrees Fahrenheit	-30°	-20°	-10°	0°	10°	20°	30°	40°	50°	60°
Outlet Temperature Degrees Fahrenheit	72° 54°	78° 60°	84° 66°	90° 72°	96° 78°	102° 84°	108° 90°	114° 96°	120° 102°	126° 108°
Total Heat Equivalent Direct Radiation (E.D.R.)	1371 1169	1303 1100	1236 1024	1170 968	1105 905	1043 841	982 780	921 720	863 662	805 604
Heat Required to Raise Temp. of Air to 70° in E.D.R.	1350 1350	1215 1215	1080 1080	945 945	810 810	675 675	540 540	405 405	270 270	135 135
Surplus Heat E.D.R.	21 -181	88 -115	156 -56	225 23	295 95	368 166	442 240	516 315	593 392	670 469
4000 C.F.M.										
SERIES 22-4866-40 ALSO 30-4866-40 ALSO C-22-4866-40 ALSO W30-4866-40										
TWO MOTORS 720 R.P.M. FOUR FANS 7" WIDE 11" DIAMETER. PERIPHERAL SPEED 2080 FT. PER MIN.										
Inlet Temperature Degrees Fahrenheit	-30°	-20°	-10°	0°	10°	20°	30°	40°	50°	60°
Outlet Temperature Degrees Fahrenheit	72° 54°	78° 60°	84° 66°	90° 72°	96° 78°	102° 84°	108° 90°	114° 96°	120° 102°	126° 108°
Total Heat Equivalent Direct Radiation (E.D.R.)	1831 1558	1738 1467	1649 1379	1560 1293	1476 1206	1395 1123	1310 1040	1231 961	1151 882	1074 806
Heat Required to Raise Temp. of Air to 70° in E.D.R.	1800 1800	1620 1620	1440 1440	1260 1260	1080 1080	900 900	720 720	540 540	360 360	180 180
Surplus Heat E.D.R.	31 -242	118 -153	209 -61	300 33	396 126	495 223	590 320	691 421	791 522	894 626

DEFINITION OF NOMENCLATURE IN TABLE OF CAPACITIES

- (1) The use of a suffix number in series designates a unit with a capacity range as indicated in the Tables. Variation in capacity of any unit is obtained thru speed control on motor, thus where the suffix number 30 is used the capacity of the unit is 2001 to 3000 C.F.M.
- (2) The use of prefix letter "W" indicates a window inlet arrangement.
- (3) The use of prefix letter "C" indicates a ceiling unit with either window or wall box inlet.
- (4) Series 22-4856-30 indicates a unit 22 inches wide, 48 inches high, 56 inches long, with a capacity range from 2001 C.F.M. to 3000 C.F.M.
- (5) Red figures indicate high temperature—black, low temperature radiators.
- (6) To convert equivalent direct radiation (E.D.R.) as given above to B.T.U. multiply by 240.
- (7) To obtain pounds of condensate divide equivalent direct radiation (E.D.R.) by 4.
- (8) UNIVERSAL units covered by this publication are identified by nomenclature given above in addition to being known as Type A.

UNIVERSAL
Heating & Ventilating Unit

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED

TYPICAL SPECIFICATION

Furnish and install where shown on plans UNIVERSAL Type A mechanical heating and ventilating units, as manufactured by John J. Nesbitt, Inc., Holmesburg, Philadelphia, Pa., and sold by the American Blower Corporation, Detroit, Mich.

The UNIVERSAL Units shall be size called for on plans.

Each unit to be equipped with a mechanism consisting of (specify current characteristics) current motor, condenser transformer induction type.

Each motor must be provided with three speed switch capable of reducing motor speed about 100 R.P.M. at each stage.

Motor must be totally enclosed type, and fitted with phosphor bronze sleeve bearings.

The oiling system shall be wool packed type, with oil reservoirs of sufficient capacity to require oiling not more than once per heating season. The oil fillers shall be so located that all the oil must pass thru fine wool packing before reaching the phosphor bronze bearings, thereby filtering the oil.

Fans shall be Sirocco multiblade double inlet type, enclosed in a steel housing, and must deliver the amount of air required, at a speed not to exceed 900 R.P.M.

The motor and fan housing shall be securely fastened to a No. 10 gauge steel motorboard with angle iron reinforcement. This motor board shall be provided with three steel supporting points which shall rest on lead liners attached to the sides of the casing, the whole system creating a rigid metal to metal contact and support without the transmission of electrical noises.

The radiator shall have capacity noted on plans and shall be constructed with seamless copper pipes over which copper plates are pressed at 3200 pounds pressure, assuring absolute thermal contact. The radiator construction must stand an operating pressure of 125 pounds and a test pressure of 200 pounds. Brass couplings shall be used in making ground joint connections between tubes and headers, and no soldered, welded, packed, or lead joints of any kind shall be used in the radiator construction.

The ventilating units shall be equipped with a temperature control damper and a bypass chamber above the blower chamber. The bypass chamber must be so located with relation to the outlet grille, that when air is being bypassed around the radiator it thoroughly mixes with that portion of the air passing thru the radiator. When the bypass damper is in position to bypass the air entirely around the radiator this air must be deflected toward the back of the machine and away from the room occupants. This damper will be manually or thermostatically controlled in accordance with the provisions of the specifications.

The ventilating units must be arranged so that the air can be brought from outdoors, warmed if desired, and circulated in the room; or the air in the room can be reheated and recirculated if desired. This recirculation shall be accomplished by means of a circular or roll recirculating damper of aluminum, supported in phosphor bronze anti friction bearings.

A recirculating grille shall be located at the floor line at the front of the unit so that coldest air enters the unit first when recirculating.

Fresh air intake to the ventilating unit shall be made thru wall or window as shown. This contractor must furnish to the general contractor at the building, wall boxes and grilles where shown for fresh air inlets. These, together with details for setting same must be furnished before the brickwork is started. The wall boxes and grilles will be set by the general contractor.

Lintels to support brickwork above wall box to be furnished by the general contractor.

The grilles used in the fresh air intakes shall be UNIVERSAL Bronzeline constructed of $\frac{1}{4}$ " thick bronze with heavy brass rods. Grilles must be securely fastened to No. 14 gauge galvanized iron boxes. Wall box intake connection must be provided with galvanized iron stationary louvres.

The casing of each heating and ventilating unit shall be not more than 14" deep, 32" high, and must be rigidly braced and constructed of No. 14 gauge cold rolled, stretcher levelled, first quality furniture stock steel. The front of the unit must be removable as one piece, giving complete access to the unit. This front shall be held in place when closed by two cam locks requiring a special custodian's key for opening.

The back of the unit must be fitted with a felt sealing strip, so arranged that when the unit is pressed hard against the wall and fastened in place there will be no leakage of air up the wall space to the room; the whole arrangement forming a complete airtight joint.

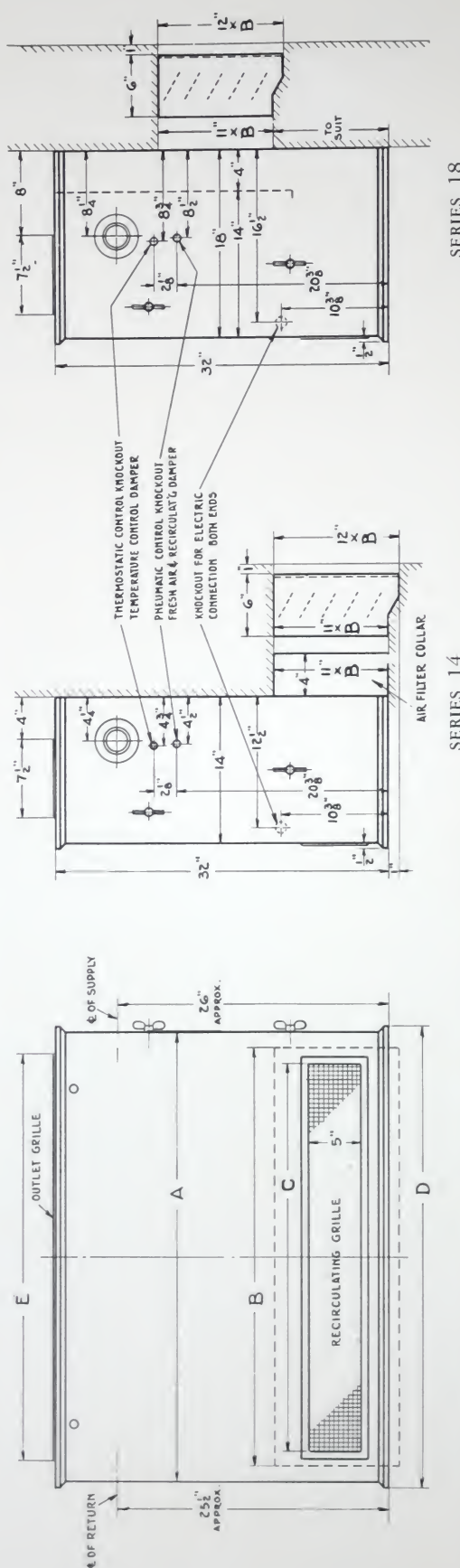
All exposed parts of the unit shall be finished in olive green Duco.

The UNIVERSAL Units must be set in strict accordance with the manufacturer's instructions.

When UNIVERSAL Units are to be equipped with air filters, include the following specifications:

"UNIVERSAL air filters of the Adhesive Impingement type shall be furnished with each unit. Provide one cleaning and loading tank and one charge of filter oil with filters. Filter must be easily removable for cleaning."

Dimensions



Series Number	C.F.M.	A	B	C	D	E	Radiator Length
14-3234—18-3234	450—750	34"	30"	28"	35"	30"	A Less 2"
14-3243—18-3243	751—1260	43"	40"	37"	44"	39"	A Less 1½"
14-3256—18-3256	1261—1560	56"	50"	47"	57"	52"	A Less 4½"

Series 14 and 18 are each manufactured in three cabinet sizes, as covered by dimensions on this page.

Dimensions of Series W-18 identical with Series 18.

Series Nos. 14-3234, 18-3234, 14-3243, 18-3243, are each equipped with one motor operating two fans.

Series Nos. 14-3256 and 18-3256 are each equipped with one motor operating four fans.

Knockouts for electric connections are provided for both ends of casing. Electric connection can be made at either end as best suits the conditions at the building.

Feed and return connections are interchangeable and may be placed at either end, but must be on opposite ends. Connections cannot be made top and bottom, same end.

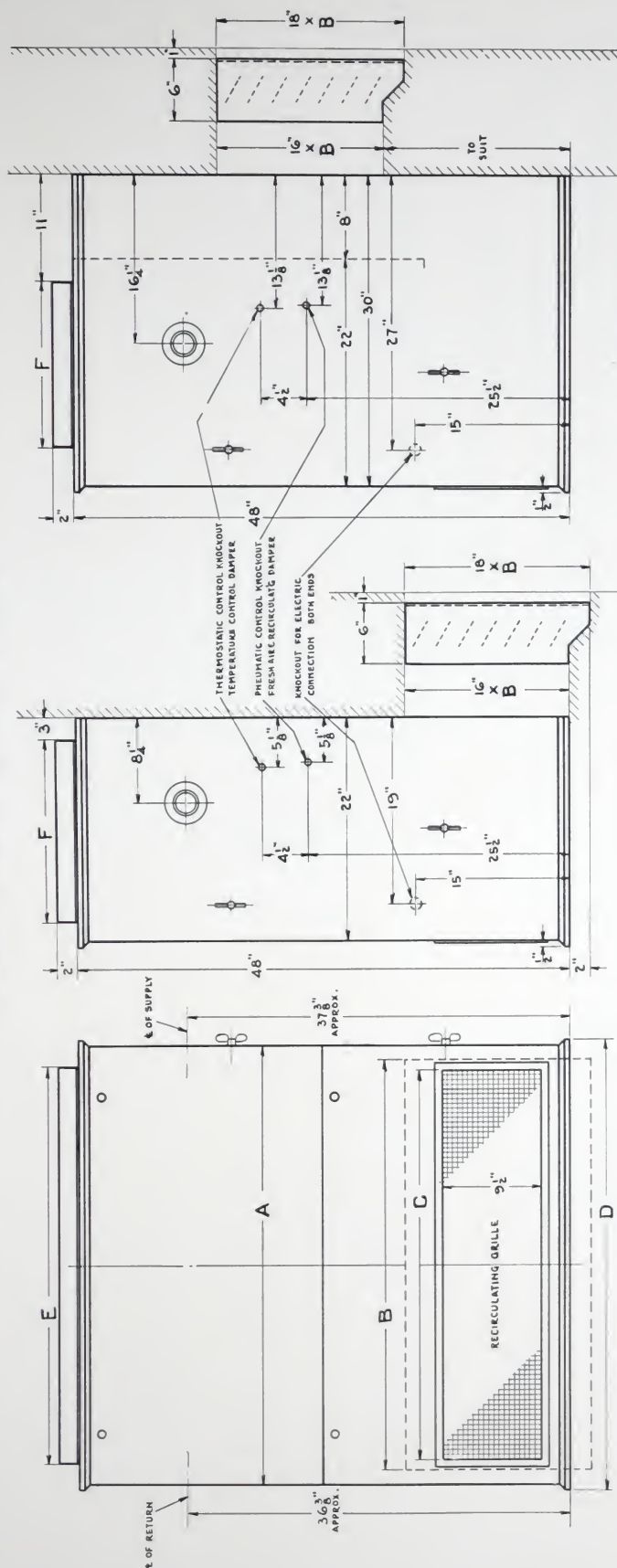
TAPPINGS: Feed 2", return 1". Where smaller tappings are specified, eccentric reducers must be provided by others.

When it is desired to recess Units more than 2" without making recess longer than Unit casing, the feed and return connections to radiator are 2" off center, roughing-in $6\frac{1}{4}$ " from back of Unit on Series No. 14, $10\frac{1}{4}$ " on Series No. 18, making it possible to recess Series No. 14, 4" and Series No. 18, 8".

Air-line outlets for thermostatic and pneumatic control of dampers as well as handles for manual control of dampers should be on right hand end of Unit as shown, but can be on opposite end when so specified.

Dimensions

2000 to 4000 C.F.M. UNIVERSAL Type A Quiet Operating Units, Series 22-4843—22-4856—22-4866—30-4843—30-4856—30-4866



SERIES 22

SERIES 30

Series Number	C.F.M.	A	B	C	D	E	F	Radiator Length
22-4843—30-4843	2000	43"	40"	38"	44"	40"	15"	A Less 1 1/2"
22-4856—30-4856	2001—3000	56"	50"	50"	57"	46"	18"	A Less 4 1/2"
22-4866—30-4866	3001—4000	66"	60"	60"	67"	56"	18"	A Less 14 1/2"

Series 22 and 30 are each manufactured in three cabinet sizes as covered by dimensions on this page. Series Nos. 22-4843 and 30-4843 are each equipped with one motor operating two fans. One electric connection is required and may be at either side of unit, knockouts being provided on both sides.

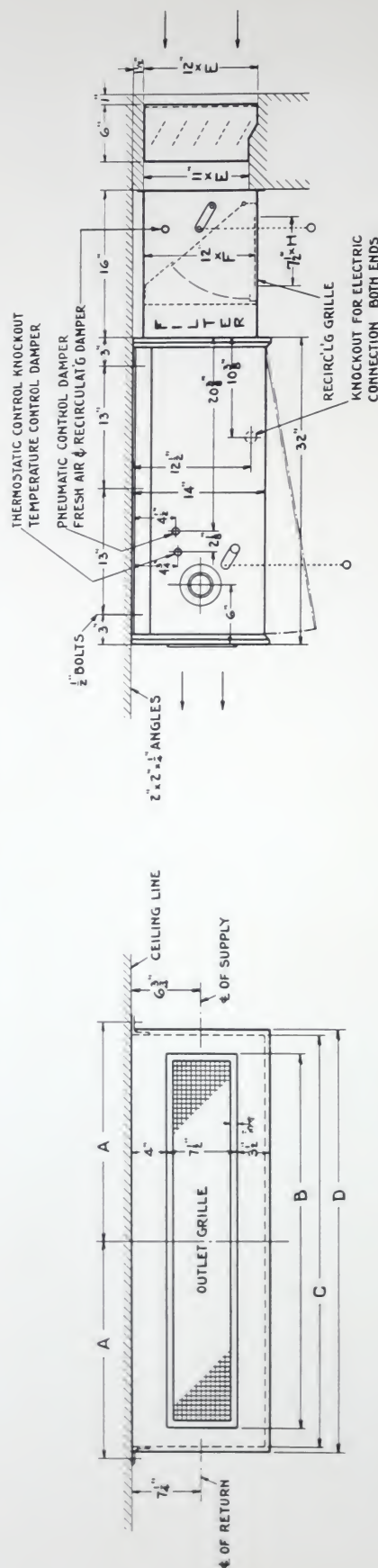
Series Nos. 22-4856, 30-4856, 22-4866 and 30-4866 are each equipped with two motor and fan assemblies. Each assembly has one motor and two fans. Two electric connections are required, one at each end of unit.

Only one radiator is used in each series. Feed and return connections are interchangeable and may be at either end, but must be on opposite ends. Connections cannot be made top and bottom, same

TAPPINGS: Feed 2 1/2", return 1 1/2". Where smaller tapings are specified, eccentric reducers must be provided by others.

Dimensions

Series C-14—450 to 1561 C.F.M. UNIVERSAL Type A Quiet Operating Units, Series C-14-3234—C-14-3243—C-14-3256



ends of casing. Electric connections can be made at either end as best suits the conditions at the building.

Feed and return connections are interchangeable and may be placed at either end, but must be on opposite ends. Connections cannot be made top and bottom, same end.

TAPPINGS: Feed 2", return 1". Where smaller tappings are specified, eccentric reducers must be provided by others.

Air-line outlets for thermostatic and pneumatic control of dampers, as well as handles with chain for manual control of dampers, should be on right hand end of unit as shown, but can be on opposite end when so specified.

Furnished with 2" collar in place of outlet grille where specified.

Outlet for pneumatic control provided in inlet connection in addition to unit casing. Only one outlet need be used.

Series Number	C.F.M.	A	B	C	D	E	F	Radiator Length
C-14-3234	450—750	18 1/8"	30"	34"	35"	30"	32"	C Less 2"
C-14-3243	751—1260	22 5/8"	39"	43"	44"	40"	42"	C Less 1 1/2"
C-14-3256	1261—1560	29 1/8"	52"	56"	57"	50"	52"	C Less 4 1/2"

Series C-14 is manufactured in three cabinet sizes as covered by dimensions on this page.

This series can be connected to fresh air inlet thru wall box as shown above, or to upper part of window, similar to window inlet on Series W-18, page 22.

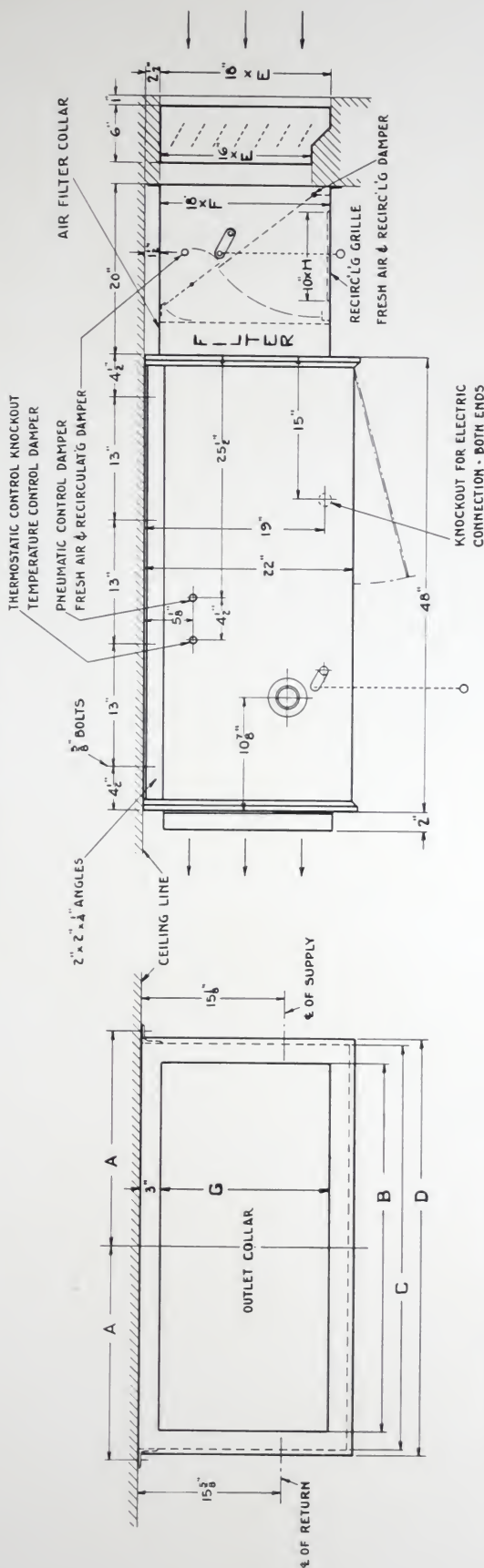
Series Nos. C-14-3234 and C-14-3243 are each equipped with one motor operating two fans.

Series No. C-14-3256 is equipped with one motor operating four fans.

Knockouts for electric connections are provided for both

Dimensi

Series C—2000 to 4000 C.F.M. UNIVERSAL Type A Quiet Operating Units, Series C-22-4843—C-22-4856—C-22-4866



Feed and return connections are interchangeable and may be at either end, but must be on opposite ends. Connections cannot be made top and bottom, same end.

TAPPINGS: Feed $2\frac{1}{2}$ ", return $1\frac{1}{2}$ ". Where
are specified, eccentric reducers must be pro-

Series C-22 is manufactured in three cabinet sizes as covered by dimensions on this page.

Series No. C-22-4843 is equipped with one motor operating two fans. One electric connection is required, and may be at either end of casing.

Series Nos. C-22-4856 and 22-4866 are each equipped with two motor and fan assemblies. Each assembly has one motor operating two fans. Two electric connections are required, one at each end of casing. Only one radiator is used in all UNIVERSAL Units.

Series Number	C.F.M.	A	B	C	D	E	F	G	Radiator Length
C-22-4843	2000	22 $\frac{5}{8}$ "	40"	43"	44"	40"	42"	15"	C Less 1 $\frac{1}{2}$ "
C-22-4856	2001—3000	29 $\frac{1}{8}$ "	46"	56"	57"	50"	52"	18"	C Less 4 $\frac{1}{2}$ "
C-22-4866	3001—4000	34 $\frac{1}{8}$ "	56"	66"	67"	60"	62"	18"	C Less 14 $\frac{1}{2}$ "

Feed and return connections are interchangeable and may be at either end, but must be on opposite ends. Connections cannot be made top and bottom, same end.

TAPPINGS: Feed $2\frac{1}{2}$ ", return $1\frac{1}{2}$ ". Where
are specified, eccentric reducers must be pro-

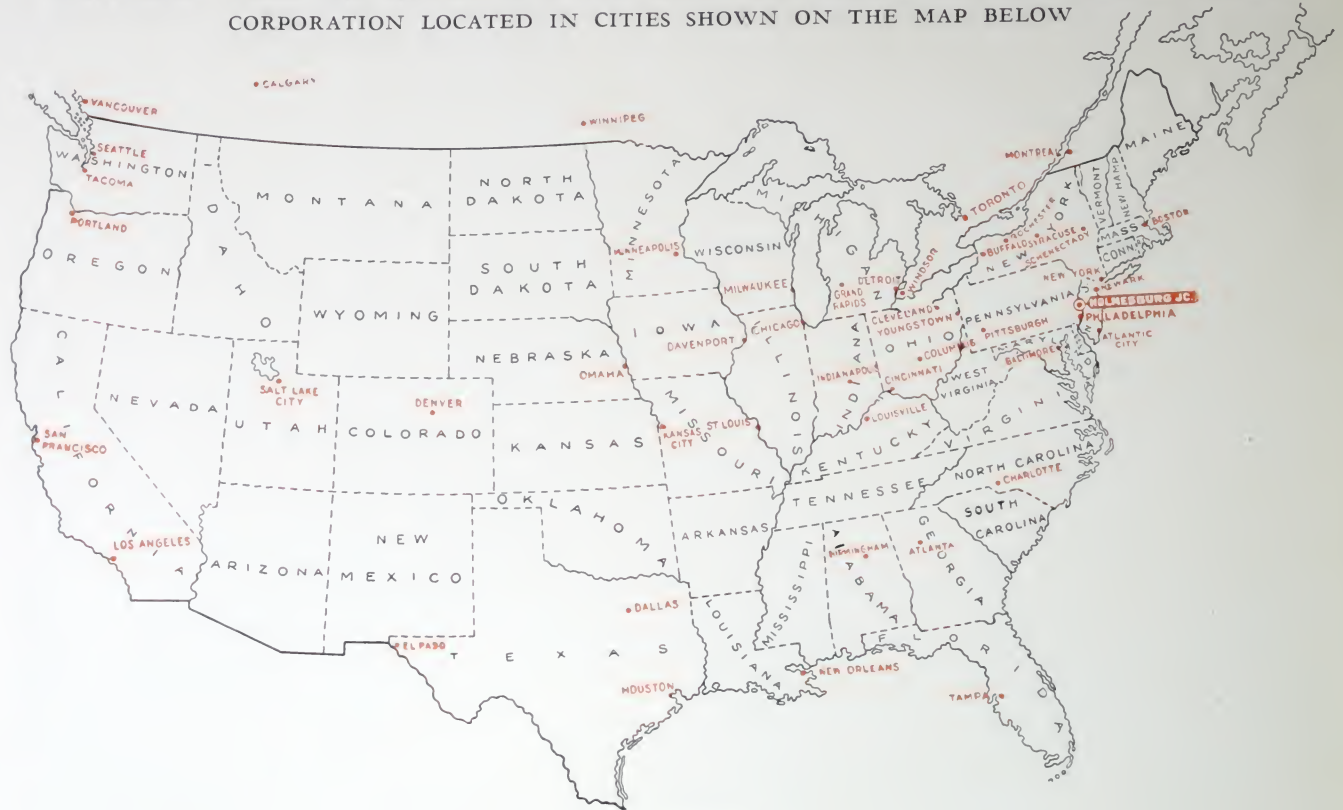
Series C-22 is manufactured in three cabinet sizes as covered by dimensions on this page.

Series No. C-22-4843 is equipped with one motor operating two fans. One electric connection is required, and may be at either end of casing.

Series Nos. C-22-4856 and 22-4866 are each equipped with two motor and fan assemblies. Each assembly has one motor operating two fans. Two electric connections are required, one at each end of casing. Only one radiator is used in all UNIVERSAL Units.

Nation Wide Sales and Service

"UNIVERSAL" SALES AND SERVICE IS NATION WIDE THRU OFFICES OF THE AMERICAN BLOWER CORPORATION LOCATED IN CITIES SHOWN ON THE MAP BELOW



The Home of
UNIVERSAL Unit



Bird's-eye View
of Plant

UNIVERSAL Unit Heaters are manufactured by John J. Nesbitt, Inc., and guaranteed to be free from mechanical defects in manufacture and operation. We will, after a season's use, accept the return and refund the full purchase price of any UNIVERSAL Unit that has failed to perform as represented herein.

JOHN J. NESBITT, INC.

Executive Office and Factory, HOLMESBURG, PHILADELPHIA, PA.

11 PARK PLACE, NEW YORK CITY

Devotion to the principle
of Continuous improvement of
our product is our ever
mindful obligation
John F. Nesbitt
President

